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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/451,108	11/30/1999	WANG RAE KIM	K-119	8600

7590 03/31/2004
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14500 Avion Parkway
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Chantilly, VA 20151

EXAMINER

KUMAR, PANKAJ

ART UNIT	PAPER NUMBER
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2631

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DATE MAILED: 03/31/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/451,108

Applicant(s)

KIM, WANG RAE

Examiner

Pankaj Kumar

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 1/28/2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9, 11, 13-15, 17-20 and 22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 15 and 17-19 is/are allowed.
- 6) ☒ Claim(s) 1-9, 11-14, 20, 22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 1/28/2004 have been fully considered but they are not persuasive.
2. Applicant argues that Santos teaches phase shifters but does not teach that the phase shifters are amplitude invariant. This is not persuasive since the office's rejection stated that although Santos did not say that its phase shifters are amplitude invariant, it is inherent for a good phase shifter to be amplitude invariant. Applicant has not argued against this reasoning.
3. Applicant also argues that if element 15 in Santos is a coupler to separate I and Q channels, then element 15 cannot also be a phase shifter. This is not persuasive since the office action had an obviousness type rejection and stating, "What Santos does not show is that the coupler is a separate component from the first amplitude invariant phase shifter. It would have been obvious to one skilled in the art at the time of the invention to modify Santos to divide element 15 of into the two components ... " The two components are the coupler and the phase shifter since the process of separating into I and Q channels involves phase shifting.
4. Applicant argument that the same component cannot be identified for different limitations is not persuasive. One component in Santos performs two separately claimed limitations of applicant's invention. This requires that the same component in Santos be identified twice for both claimed limitations.

Response to Amendment

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-9, 11-14, 20, 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Santos et al. 5119399.

3. As per claim 1, Santos teaches a vector modulator, comprising: a first amplitude invariant (inherent for a good phase shifter to be amplitude invariant) phase shifter to shift a phase of an input signal (Santos fig. 1: the input of element 15 is a local oscillating signal which has a phase which element 15 shifts to 0 degrees and 90 degrees; also element 13 is described as a carrier signal source in col. 4 lines 34 to 35 of Santos. A carrier signal is used to modulate a data signal which shifts the phase of an input signal comprised of a modulated data signal.); a coupler to separate an output of the first amplitude invariant phase shifter into first and second channel signals (Santos fig. 1: 15 separates into I and Q components. What Santos does not show is that the coupler is a separate component from the first amplitude invariant phase shifter. It would have been obvious to one skilled in the art at the time of the invention to modify Santos to divide element 15 into the two components since it has been held that rearranging parts of an invention requires routine skill in the art. Also, lacking any criticality, to shift location of prior art parts does not make the claimed invention patentable over that prior art (In re Japikse, 86 USPQ 70). Also, lacking any criticality, to make prior art parts separable does not make the

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claimed invention patentable over that prior art (Nerwin v. Erlichman, 168 USPQ 177).),
wherein the first channel signal is an I channel signal and the second channel signal is a Q
channel signal that is phase shifted approximately 90 degrees from the I channel signal (Santos
figure 1: 15 shows separation into I and Q and also indicates 0 degrees and 90 degrees); a second
amplitude invariant phase shifter (Santos fig. 1: 17) to shift a phase (inherent for a phase shifter
to do so) of the first channel signal; a third amplitude invariant phase shifter (Santos fig. 1: 21) to
shift a phase of the second channel signal; and a combiner (Santos fig. 1: 25) that receives and
combines signals from the second and third invariant phase shifters (Santos fig. 1: 25 receives
signals from 17 and 21 via 19 and 23) and provides an output, wherein the first, second and third
amplitude invariant phase shifters respectively shift within first, second and third prescribed
shifting ranges (Santos fig. 1: 15 shifts between 0 and 90, 17 shifts to adjustable phase ϕ_1 –
col. 4 lines 43-44, 21 shifts to adjustable phase ϕ_2 col. 4 lines 49-52, last full paragraph col. 4).

4. As per claim 2, Santos teaches the vector modulator of claim 1, wherein the coupler is
quadrature hybrid (Santos fig. 1: 15 outputs inphase and quadrature and its input is a hybrid of
the two) coupler selected from one of a branch line (Santos fig. 1: output of 15 divides into two
branches), a Lange coupler, and a Wilkinson divider.

5. As per claim 3, Santos teaches the vector modulator of claim 1, wherein the first
amplitude invariant phase shifter delays the input signal by fixed intervals (Santos fig. 1:
inherent for 15 to cause a fixed delay) within a first prescribed shifting range of approximately 0°
-- 360° (not in Santos. Instead Santos teaches shifting range of 0 to 90 degrees. It would have
been obvious to one skilled in the art at the time of the invention to modify Santos since it has
been held that where the general conditions of a claim are disclosed in the prior art, discovering

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the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.).

6. As per claim 4, Santos teaches the vector modulator of claim 1, wherein the second amplitude invariant phase shifter delays the first channel signal by a prescribed phase within a variable phase range of approximately 0° -- 90° (not in Santos. Instead Santos teaches in col. 4 last full paragraph teaches that ϕ_1 is arbitrarily adjustable. It would have been obvious to one skilled in the art at the time of the invention to modify Santos with a range for ϕ_1 to be from 0 to 90 degrees since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.).

7. As per claim 5, Santos teaches the vector modulator of claim 1, wherein the third amplitude invariant phase shifter delays the second channel signal by a prescribed phase within a variable phase range of approximately 0° --- 90° (not in Santos. Instead Santos teaches in col. 4 last full paragraph teaches that ϕ_2 is arbitrarily adjustable. It would have been obvious to one skilled in the art at the time of the invention to modify Santos with a range for ϕ_2 to be from 0 to 90 degrees since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.).

8. As per claim 6, Santos teaches the vector modulator of claim 1, wherein each of the first, second and third amplitude invariant phase shifters is a reflection type amplitude invariant phase shifter (Santos fig. 1: the outputs of the components are a reflection of their inputs).

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9. As per claim 7, Santos teaches the vector modulator of claim 6, wherein each of the first, second and third amplitude invariant phase shifters includes at least one PIN diode (not in Santos. It would have been obvious to one skilled in the art at the time of the invention to modify Santos to teach these elements since it has been held that the selection of known material based on its suitability for the intended use for prior art parts does not make the claimed invention patentable over that prior art (In re Leshin, 125 USPQ 416).) and a hybrid coupler (Santos fig. 1: 15, 17, 21 couple to the hybrid signal output of 13 via other components).

10. As per claim 8, Santos teaches the vector modulator of claim 6, wherein each of the first, second and third amplitude invariant phase shifters includes at least one varactor diode (not in Santos. It would have been obvious to one skilled in the art at the time of the invention to modify Santos to teach these elements since it has been held that the selection of known material based on its suitability for the intended use for prior art parts does not make the claimed invention patentable over that prior art (In re Leshin, 125 USPQ 416).) and a hybrid coupler (Santos fig. 1: 15, 17, 21 couple to the hybrid signal output of 13 via other components).

11. As per claim 9, Santos teaches the vector modulator of claim 6, wherein each of the first, second and third amplitude invariant phase shifters includes at least one PIN diode and a circulator (not in Santos. It would have been obvious to one skilled in the art at the time of the invention to modify Santos to teach these elements since it has been held that the selection of known material based on its suitability for the intended use for prior art parts does not make the claimed invention patentable over that prior art (In re Leshin, 125 USPQ 416).).

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12. As per claim 12, Santos teaches the vector modulator of claim 1, wherein the first channel signal is an I channel signal and the second channel signal is a Q channel signal that is phase shifted approximately 90° from the I channel signal (Santos fig. 1: 15, 17, ϕ_1 , 21, ϕ_2).

13. Claims 13, 14 are discussed in claims 1-9 and 12 above.

14. As per claim 20, Santos teaches the vector modulator of claim 1, wherein the first amplitude invariant phase shifter adjusts a distribution of signals outputted from a combiner in a polar coordinate system (Santos fig. 1: 0 and 90 degrees are in a polar coordinate system) by adjusting phases of incoming signals (Santos fig. 1: 15 is adjusting the phase to 0 and 90 degrees).

15. As per claim 22, Santos teaches the vector modulator of claim 21, wherein the combiner calculates a vector sum (Santos fig. 1: 25) wherein the first amplitude invariant phase shifter delays the input signal by fixed intervals (Santos fig. 1: inherent for 15 to cause a fixed delay) within the first prescribed shifting range (Santos teaches shifting range of 0 to 90 degrees.) wherein the second and third amplitude invariant phase shifter (Santos fig. 1: 17, 21) delay the first and second channel signals (Santos: inherent for components 17 and 21 to cause a delay in I and Q channels) by first and second phases (Santos col. 4 last full paragraph: ϕ_1 , ϕ_2) within the second and third prescribed shifting ranges (Santos teaches in col. 4 last full paragraph teaches that ϕ_1 and ϕ_2 are arbitrarily adjustable.)

Allowable Subject Matter

16. Claims 15, 17-19 are allowed.

17. The following is a statement of reasons for the indication of allowable subject matter:

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18. As per claim 15, Belcher teaches a circuit for a high power amplifier (Belcher Field of Invention: “ ... adaptive RF power amplifier ... ”), comprising: a divider (Belcher fig. 2: 101) to divide an input signal into a first signal (Belcher fig. 2: 105) and a second signal (Belcher fig. 2: 107); a vector modulator (Belcher fig. 2: 110) to receive the first signal (Belcher fig. 2: 111 is a modified version of 105) and a control signal (Belcher fig. 2: 113 is a modified version of 107) and output a vector modulated signal (Belcher fig. 2: output of 110); an amplifier to amplify the vector modulated signal (Belcher fig. 2: 116); a directional coupler (Belcher fig. 2: 123) to receive a signal from the amplifier and generate a reference signal; and a fast phase-amplitude controller (Belcher fig. 2: 180) to compare amplitudes and phases of the reference signal (Belcher fig. 2: input 181) and the second signal (Belcher fig. 2: 107) delayed for a prescribed time period (inherent for various components to cause delay), to provide the control signal, wherein the vector modulator comprises: a first amplitude invariant phase shifter to shift a phase of the first signal within a first prescribed shifting range; a coupler to separate an output of the first amplitude invariant phase shifter into I and Q channel signals having approximately a 90° phase difference relative to each other; a second amplitude invariant phase shifter to shift a phase of the first channel signal by a first fixed amplitude within a second prescribed shifting range; a third amplitude invariant phase shifter to shift a phase of the second channel signal by a second fixed amplitude within a third (not in Kumar or Belcher) prescribed shifting range; and a combiner to receive signals from the second and third invariant phase shifters and calculate a vector sum thereof and generate the vector modulated signal.

19. Claims 17, 18 and 19 depend on claim 15.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pankaj Kumar whose telephone number is (703) 305-0194. The examiner can normally be reached on Mon, Tues, Wed and Thurs after 8AM to after 6:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad H. Ghayour can be reached on (703) 306-3034. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PK

TEMESGHEN GHEBRETINSAE
PRIMARY EXAMINER
3/15/11